IN THE SPECIFICATION:

Please amend paragraphs [001], [003], [050], [055], [060], [069], [089], [110], [114], [123], [127], [132], [176] and [189] as shown below, in which deleted terms are shown with strikethrough and added terms are shown with underscoring.

Paragraph [001]

1. Field of the Invention

The present invention relates to an electric parking brake system in which a parking brake is operated by an electric motor.

Paragraph [003]

2. Discussion of Background Art

Electric parking brake systems are known in which an electric motor is driven to operate or release a parking brake when the operation of an associated switch is detected or the stop of a vehicle is detected, and the electric parking brake systems of this kind are sometimes used as a back-up system in case a service brake which is operated by a brake pedal fails (for example, refer to the following patent literature).

[Patent Literature]

JP-B-4-28576

Paragraph [050]

Figs. 1 to 31 show~~n~~ an embodiment of the invention, in which Fig. 1 is a plan view of a vehicle in which an electric parking brake system is installed, Fig. 2 is an explanatory view of a control system of the electric parking brake system, Fig. 3 is a drawing showing the configuration of a manual operation command switch, Fig. 4 is a circuit diagram of the manual operation command switch, Fig. 5 is an explanatory diagram of the operation of the manual operation command switch and output signals, Figs. 6 and 7 are flowcharts of a manual operation command switch operation determination routine, Fig. 8 is an exploded perspective view of the

electric parking brake system, Fig. 10 is a flowchart of a stop determination routine, Figs. 11 to 14 are flowcharts of an automatic operation routine, Figs. 15 and 16 are flowcharts of an automatic actuation routine, Fig. 17 is a flowchart of an automatic release routine, Fig. 18 is a flowchart of an automatic release 2 routine, Figs. 19 and 20 are flowcharts of an automatic pulling force increase routine, Figs. 21 to 23 are flowcharts of a manual operation routine, Figs. 24 and 25 are flowcharts of a manual actuation routine, Fig. 26 is a flowchart of a manual release routine, Fig. 27 is a map for retrieving a pulling force for the electric parking brake system from the gradient of a road surface, Fig. 28 is a map for retrieving a throttle opening or position from the gradient of the road surface, Fig. 29 is a timing diagram illustrating the function of the electric parking brake system when the operating switch is depressed intermittently while the vehicle is running, Fig. 30 is a timing diagram illustrating the function of the electric parking brake system when the operating switch is depressed continuously while the vehicle is running, and Fig. 31 is a timing diagram illustrating the function of the electric parking brake system when the operating switch is depressed intermittently while the vehicle is running in a state in which the road surface friction coefficient is small.

Paragraph [055]

The manual operation command switch 23b includes an operation switch 41 and a release switch 42 which are disposed in parallel. Furthermore, the operation switch 41 is made up of a normally opened contact 41a and a normally closed contact 41b which are disposed in parallel, and the release switch 42 is made up of a normally opened contact 42a and a normally closed contact 42b which are disposed in parallel. When the upper end of the manual operation command switch 23b is depressed, the normally opened contact 41a and the normally closed contact 41b of the operation switch 41 are kept closed and opened, respectively, only by a duration of the depression. In addition, when the lower end of the manual operation command switch 23b is depressed, the normally opened contact 42a and the normally closed contact 42b of the release switch 42 are kept closed and opened, respectively, only by a duration of the depression.

[Table 1]

	Signal 1	Signal 2	Signal 3	Signal 4
When SW is off	OFF	ON	OFF	ON
When Operation SW is on	ON	OFF	OFF	ON
When Release SW is on	OFF	ON	ON	OFF

Paragraph [060]

Firstly, in step S301, read signals 1 to 4, and if the signal 1 and the signal 2 are determined not to coincide with each other in step S302, if the signal 3 and the signal 4 are determined not to coincide with each other in step S303, if the signal 1 is determined to be on in step S304, and if the signal 3 is determined to be off in step S305, in step s306, the electric parking brake system ECU 22 outputs an operation signal to operate the electric parking brake system 12. In addition, if the signal 1 is determined to be off in step S304, and if the signal 3 is determined to be on in step s307, in step S308, the electric parking brake system ECU 22 outputs a release signal to release the electric parking brake system 12. Furthermore, if the signal 1 is determined to be off in step S304, and the signal 3 is determined to be off in step S307, the electric parking brake system ECU 22 determines that the manual operation command switch 23b is in the neutral condition and outputs neither an operation signal nor a release signal.

Paragraph [069]

A take-up drum 31a is integrally formed on an outer circumference of the planet carrier 31, and the pulling cable 26 wound around an outer circumference of the take-up drum 31a is connected to a central portion of an equalizer 38. The Bowden cables 13, 13 are each made up of an outer tube 13a and an inner cable 13b, and the inner cables 13b, 13b extending outwardly from the pair of outer tubes 13a, 13a which are fixed to an end portion of the casing 25 are then connected to end portions of the equalizer 38 which makes uniform the tensions of the both inner cables 13b, 13b.

Paragraph [089]

The third target pulling force BfT3 is such as to be used when the gradient sensor 23i becomes out of order when the stop of the vehicle is determined in both the automatic operation mode and the manual operation mode and is calculated as below.

BfT3 = (braking force corresponding to a braking force which can hold the vehicle in a stopped condition on a slope of a gradient of 30%) × (state coefficient k)

Paragraph [110]

Fig. 28 shows a map for retrieving a release threshold THD for the throttle opening from the gradient of the road surface. In a case where the vehicle moves forward on a slope which is upward ahead of the vehicle, while the release threshold THD with which the automatic release is executed basically increases linearly as the gradient increases from 0%, the release threshold THD is set smaller than the linear characteristics (refer to a broken line) on a low gradient ground whose gradient ranges from 0% to 10%. To be specific, in an area where the gradient ranges from 0% to 5%, the release threshold is set to 0°, and in an area where the gradient ranges from more than 5% to 10%, the rate of increase of the release threshold THD is set higher in order that the linear characteristics can be restored. Thus, in the area having the gradient ranging from 0% to 5% where there is imposed no risk that the vehicle slides down, that is, when the creeping force produced by the engine exceeds the moving force produced by the gradient of the road surface, the electric parking brake system 12 is released at the same time as the accelerator pedal is depressed, whereby a jerky feeling felt at the time of starting the vehicle from the rest can be eliminated so that a smooth start is enabled. In the area where the gradient ranges from more than 5% to 10%, since the throttle opening with which the electric parking brake system 12 is automatically released increases as the gradient increases, the vehicle can be prevented from moving in the reverse direction when it starts from the standstill.

Paragraph [114]

Then, when a gear position detected by the gear position sensor 23e is determined to be "D" in step S70, if the accumulated traveling mileage S is determined to be less than −10 cm in step S71, it is determined that the braking force is short, and an automatic pulling force increase is performed in step S75. In contrast, when the gear is determined not to be in the "D" position

in the step S70 but in the "R" position in step S72, if the accumulated traveling mileage S is determined to exceed~~s~~ 10 cm in step S73, that is, if the vehicle travels forward a distance longer than 10 cm, it is determined that the braking force is short, an automatic pulling force increase is performed in the step S75. Furthermore, when the gear is determined not to be in the "R" position in the step S72, that is, when the gear is determined to be in either the "P" of "N" position, if the absolute value of the accumulated traveling mileage S is determined to exceed 10 cm in step S74, that is, if the vehicle travels forward or backward a distance longer than 10 cm, it is determined that the braking force is short, and an automatic pulling force increase is performed in the step S75.

Paragraph [123]

In contrast, if the current value of the electric motor 24 is determined to be less than the target current TA in the step S94, and if the actuation timer provides a count of less than 3.0~~s~~ sec in step S95, then, it is judged in step S100 that the electric motor 24 continues to operate, and then the continue-operation flag is reset to "1". Then, if the actuation timer provides a count of 3.0sec or longer in the step S99, it is inferred that the electric parking brake system 12 cannot be brought to an operation-completed condition due to the Bowden cables 13, 13 being broken. Then, in step S101, a fail safe process is performed during the operation, and move to the step S97 thereafter.

Paragraph [127]

If the stroke of the electric parking brake system 12 detected by the stroke sensor 23j (refer to Fig. 2) is determined not to be equal to or less than a 0 position (a release- completed position) + 2mm, the electric motor 24 is driven to rotate in the reverse direction with a duty ratio of 100% in order to release the electric parking brake system 12 in step S117, and the electric parking brake system 12 is thus released. After the release timer is counted up in the following step S118, if the release timer provides a count of less than 3.0sec in step 119, it is judged in step S120 that the electric parking brake system 12 continues to be released, and the continue-release flag is set to "1". Then, if the release timer provides a count of 3.0sec or longer in the step s119, it is inferred that the drive system of the electric parking brake system 12 gets frozen and hence a

release-completed condition cannot be attained, and a fail safe process is executed in the middle of release in step S121.

Paragraph [132]

If the stroke of the electric parking brake system 12 detected by the stroke sensor 23j is determined not to be equal to or less than the 0 position (the release-completed position) + 2mm, the electric motor 24 is driven to rotate slowly in the reverse direction with a duty ratio of 50% (half the duty ratio used for the automatic release described by reference to Fig. 17) in order to release the electric parking brake system 12 in step S137, and the electric parking brake system 12 is thus released. After the release timer is counted up in the following step S138, if the release timer provides a count of equal to or longer than 2.0sec in step 139, it is inferred that the release-completed condition cannot be attained due to a shortage of power that is supplied to the electric parking brake system 12, an automatic release is executed in step S140 in which the electric motor 24 is driven to rotate in the reverse direction with the duty ratio of 100% (refer to the flowchart shown in Fig. 17).

Paragraph [176]

When the driver requests a further deceleration and then depresses the operation switch 41 of the manual operation command switch 23b again at position e, the target deceleration Gt is set to –0.30G in response to the command level flag = "2", and the electric motor 12 of the electric parking brake system 12 is re-energized in order to produce a deceleration of –0.30G. While a surge current flows at position f at that moment, thereafter, as the tension of the Bowden cables 13, 13 increases at position g, the current value of the electric motor 24 gradually increases, and in parallel with this, the stroke of the electric parking brake system 12 gradually increases, whereby the braking force is increased. As a result, the vehicle body deceleration GRF decreases further, and if the vehicle body deceleration <-0.30G soon at position h, energizing the electric motor 24 is stopped.

Paragraph [189]

In general, a maximum braking force generates in a condition where the wheels slightly

slip, and therefore, there exists a high possibility that the vehicle body deceleration GRF resulting while the possibility of wheel locking is being judged is a maximum vehicle body deceleration GRF that is generated on that road surface. Consequently, by setting the target deceleration Gt resulting when there exists the possibility of wheel locking to (90% of the vehicle body deceleration GRF in the embodiment) based on the aforesaid vehicle body deceleration ~~FGR~~ GRF, a maximum braking force can be obtained while preventing the occurrence of wheel locking. Moreover, a stable deceleration feeling can be obtained and adverse effects on the durability of the electric parking brake system 12 can be suppressed to a minimum level by preventing the repetition of increase and decrease in braking force of the electric parking brake system 12.